

Massachusetts.—Taunton, 13th, 14th; Amherst and Westborough, 14th.

Michigan.—Mackinaw City, 4th; Escanaba and Marquette, 4th, 6th; Kalamazoo, 4th, 7th, 27th; Traverse City, 27th; Port Huron, 29th.

Minnesota.—Saint Vincent, 3d, 16th, 17th, 25th; Moorhead, 17th.

Montana.—Poplar River, 8th, 16th; Helena, 14th, 16th, 17th, 21st, 22d; Fort Custer, 17th.

Nebraska.—Tecumseh and North Platte, 3d; Valentine, 3d, 14th, 21st; De Soto, 3d, 18th; Fairbury, 4th.

Nevada.—Carson City, 1st, 2d, 7th, 10th to 14th, 17th, 19th, 23d; Winnemucca, 7th, 11th, 12th. The frost at Carson City on the 1st killed most of the fruit and tender vegetables.

New Hampshire.—Mount Washington, 13th; Nashua, 13th, 14th.

New Jersey.—Clayton, Dover, and Roseland, 14th.

New Mexico.—Fort Stanton, 3d, 5th.

New York.—Penn Yan, 12th, 13th; Albany, 12th to 14th; Oswego, 13th; Palermo, 13th, 14th; Humphrey and North Volney, 14th.

Oregon.—Lakeview, 1st, 2d, 7th, 11th; Linkville, 1st, 7th, 10th to 12th, 20th; Fort Klamath, 1st, 4th, 11th to 13th; Bandon, 2d; Albany and Eola, 11th; Mount Angel, 11th, 12th; East Portland, 11th, 12th, 24th; Ashland, Roseburg, and Portland, 12th.

Pennsylvania.—Wellsborough, 1st, 12th, 14th, 15th; Dyberry, 13th to 15th.

Vermont.—Northfield, 2d, 14th, 15th.

Washington Territory.—Spokane Falls, 7th; Olympia, 9th, 11th, 12th; Port Angeles, 9th, 11th to 13th; Walla Walla, 12th.

West Virginia.—Middlebrook, 29th.

Wisconsin.—Fond du Lac, 4th, 18th; Embarras, 26th.

Wyoming.—Fort Bridger, 2d, 3d, 5th, 12th, 13th; Cheyenne, 3d.

ICE.

Ice formed in the various parts of the country during May as follows:

California.—Fort Bidwell, 10th to 12th.

Colorado.—Montrose, 14th.

Dakota.—Fort Totten, 3d, 4th.

Nebraska.—Tecumseh, 3d; Fairbury, 4th.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature, as observed at the harbors of the several stations; the monthly range of water temperature; the average depth at which the observations were made, and the mean temperature of the air:

Temperature of water for May, 1887.

Station	Temperature at bottom.				Mean temperature of the air at station.	Average depth of water, feet and tenths.
	Max.	Min.	Range.	Monthly mean.		
Cedar Keys, Fla.....	78.5	67.9	10.6	75.6	74.9	8.3
Charleston, S. C.....	77.1	69.4	7.7	74.7	72.7	36.6
Eastport, Me.....	42.9	38.0	4.9	40.3	48.1	13.6
Galveston, Tex.....	82.5	73.7	8.8	78.0	75.9	14.4
Key West, Fla.....	85.7	77.0	8.7	81.9	77.5	21.1
New London, Conn.....	55.7	45.0	10.7	50.6	58.3	11.5
New York City.....	63.2	47.0	16.2	57.1	62.9	15.2
Pensacola, Fla.....	80.6	74.4	6.2	77.2	75.5	17.7
Portland, Me.....	51.8	42.6	9.3	47.6	55.7	16.8

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for May, 1887, as determined from the reports of about seven hundred stations, is exhibited on chart iii. In the table of miscellaneous meteorological data are given, for each Signal Service station, the total precipitation, with the departures from the normal. The figures opposite the names of the geographical districts in columns for mean temperature, precipitation, and departures from the normal, show respectively the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal, and subtracting when above.

While over certain areas of comparatively limited extent there has been during May, 1887, precipitation in excess of the average, over much the greater part of the country it was deficient. Especially was this the case in New England, the Lake region, the lower portions of the Ohio and Missouri valleys, the upper and central portions of the Mississippi Valley, and the east Gulf states, in which districts, as a whole, there was not more than 60 per cent. of the average amount of rainfall; that for New England amounting to only about 30 per cent. of the average, and for the other districts named the deficiencies amount to from 25 to 50 per cent. In California there was less than one-half of the average rainfall for May.

The rainfall was in excess of the average in the following districts, viz., over an area extending from eastern Ohio and western Pennsylvania southward to eastern Tennessee; in northern Florida; along the south Atlantic coast from Charleston, S. C., to Wilmington, N. C.; along the west Gulf coast and over a region extending from the lower Mississippi River northwestward to, and including portions of, Kansas, Colorado, and New Mexico; along the northern border of the country from western Lake Superior to Manitoba; over portions of the southern plateau; and from the north Pacific

coast eastward to western Montana. The excess in the districts named is, in general, slight, the only exceptions being northern Florida, the north Pacific coast, eastern Tennessee, and western Pennsylvania, where it was quite marked, the rainfall on the north Pacific coast being about double the average for the month.

The following are some of the most marked departures from the normal precipitation at Signal Service stations:

Above normal.		Below normal.	
	Inches.		Inches.
Astoria, Oregon.....	4.52	Block Island, R. I.....	4.25
Tatoosh Island, Wash.....	4.40	Omaha, Nebr.....	3.56
Olympia, Wash.....	3.13	New Haven, Conn.....	3.36
Jacksonville, Fla.....	3.05	Springfield, Ill.....	3.22
Pittsburg, Pa.....	2.95	Yankton, Dak.....	3.17
Chattanooga, Tenn.....	2.56	Des Moines, Iowa.....	3.03
Portland, Oregon.....	2.33	Escanaba, Mich.....	3.02

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows, for certain stations, as reported by voluntary observers, the average precipitation for the month of May for a series of years, the precipitation for May 1887, and the departures from the average:

Station.	County.	Average precipitation for May.	Number of years.	Precipitation for May, 1887.	Departure.
		Inches.		Inches.	Inches.
Lead Hill.....	Arkansas.	6.08	5	8.57	+ 2.49
Sacramento.....	California.	0.50	21	trace.	- 0.50
Canton.....	Connecticut.	4.38	25	0.51	- 3.87
Hartford.....	Hartford.....	3.09	16	0.10	- 2.99
Middletown.....	Middlesex.....	3.65	29	0.22	- 3.43
Wallingford.....	New Haven.....	4.14	30	0.25	- 3.89
Webster.....	Dakota.	6.18	4	1.72	- 4.46

Deviations from average precipitation—Continued.

Station.	County.	Average precipitation for May.	Number of years.	Precipitation for May, 1887.	Departure
		Inches.		Inches.	Inches.
<i>Illinois.</i>					
Mattoon.....	Coles.....	5.10	7	4.70	- 0.40
Peoria.....	Peoria.....	3.75	32	1.24	- 2.51
Riley.....	McHenry.....	3.34	26	0.95	- 2.39
Sycamore.....	De Kalb.....	3.70	7	0.95	- 2.75
<i>Indiana.</i>					
Lafayette.....	Tippecanoe.....	4.79	8	2.11	- 2.68
Logansport.....	Cass.....	3.83	33	3.90	+ 0.07
Vevay.....	Switzerland.....	3.45	21	3.99	+ 0.54
<i>Iowa.</i>					
Cresco.....	Howard.....	3.38	15	0.88	- 2.50
Monticello.....	Jones.....	3.85	34	2.72	- 1.13
Muscataine.....	Muscataine.....	4.41	40	2.26	- 2.15
<i>Kansas.</i>					
Independence.....	Montgomery.....	4.25	15	3.61	- 0.64
Lawrence.....	Douglas.....	4.31	19	1.12	- 3.19
Wellington.....	Sumner.....	4.83	9	3.21	- 1.62
Yates Centre.....	Woodson.....	5.07	7	2.47	- 2.60
<i>Maine.</i>					
Cornish.....	York.....	2.97	30	2.13	- 0.84
Gardiner.....	Kennebec.....	3.85	49	1.08	- 2.77
Orono.....	Penobscot.....	3.33	19	1.25	- 2.08
<i>Maryland.</i>					
Cumberland.....	Alleghany.....	2.77	15	5.64	+ 2.87
Fallston.....	Harford.....	3.45	16	2.51	- 0.94
New Midway.....	Frederick.....	4.83	6	6.12	+ 1.29
<i>Massachusetts.</i>					
Amherst.....	Hampshire.....	3.85	52	0.75	- 3.10
Cambridge.....	Middlesex.....	3.57	46	1.70	- 1.87
Chestnut Hill.....	Middlesex.....	2.82	12	1.69	- 1.13
Framingham.....	Middlesex.....	2.88	13	1.11	- 1.77
Lake Cochituate.....	Middlesex.....	3.87	36	0.98	- 2.89
Ludlow.....	Hampden.....	2.88	12	0.85	- 2.03
Lynn.....	Essex.....	3.06	13	1.69	- 1.37
Mystic Lake.....	Middlesex.....	2.79	12	1.75	- 1.04
New Bedford.....	Bristol.....	3.94	74	2.24	- 1.70
Somerset.....	Bristol.....	3.29	17	3.12	- 0.17
Springfield.....	Hampden.....	4.14	40	1.02	- 3.12
Waltham.....	Middlesex.....	3.54	63	1.62	- 1.92
Williamstown.....	Berkshire.....	2.80	19	1.31	- 1.49
<i>Nevada.</i>					
Carson City.....	Ormsby.....	0.31	8	0.46	+ 0.15
<i>New Brunswick.</i>					
Saint John.....	Saint John.....	4.38	27	2.08	- 2.30
<i>New Hampshire.</i>					
Concord.....	Merrimac.....	3.18	32	1.27	- 1.91
Hanover.....	Grafton.....	2.61	22	3.55	+ 0.94
<i>New Jersey.</i>					
Dover.....	Morris.....	3.49	3	2.93	- 0.56
South Orange.....	Essex.....	2.83	17	0.93	- 1.90
<i>New York.</i>					
Factoryville.....	Tioga.....	2.77	5	1.33	- 1.44
Palermo.....	Oswego.....	2.69	34	1.85	- 0.84
<i>Ohio.</i>					
Wauseon.....	Fulton.....	4.00	15	3.50	- 0.50
<i>Pennsylvania.</i>					
Dyberry.....	Wayne.....	2.77	17	2.62	- 0.15
<i>South Carolina.</i>					
Kirkwood.....	Kershaw.....	3.02	20	2.14	- 0.88
Stateburg.....	Sumter.....	3.19	7	3.63	+ 0.44
<i>Texas.</i>					
New Ulm.....	Austin.....	5.70	15	3.56	- 2.14
<i>Vermont.</i>					
Lunenburg.....	Essex.....	3.61	38	2.23	- 1.38
Newport.....	Orleans.....	3.79	13	1.40	- 2.39
Stratford.....	Orange.....	2.98	13	2.20	- 0.78
<i>Virginia.</i>					
Bird's Nest.....	Northampton.....	3.12	19	2.80	- 0.32
Dale Enterprise.....	Rockingham.....	4.90	7	6.54	+ 1.64
Variety Mills.....	Nelson.....	3.93	8	5.24	+ 1.31
Wytheville.....	Wythe.....	3.66	24	3.65	+ 0.02
<i>West Virginia.</i>					
Helvetia.....	Randolph.....	4.59	10	3.65	- 0.94

* From the "Bulletin of the New England Meteorological Society."

The following notes on precipitation are furnished by the voluntary observers:

Arkansas.—Lead Hill, Boone Co.: the total precipitation for the spring of 1887, 14.43, is 1.23 above the average for the past five years.

Illinois.—Riley, McHenry Co.: the total precipitation for May, 1887, is 0.95; this is the smallest May precipitation for a period of twenty-six years, with two exceptions, viz., 1870 and 1877. The total precipitation for the spring of 1887, 8.51, is the smallest amount recorded during any spring for the last twenty-six years, and is 5.15 less than the average for the same period.

Indiana.—Lafayette, Tippecanoe, Co.: the total precipitation for the month of May, 2.11, is 3.68 below the average for a term of eight years, and is the least recorded in any May during that time.

Logansport, Cass Co.: the greatest precipitation for May during the last thirty-three years, 8.24, occurred in 1880; the least, 1.20, in 1862.

Vevay, Switzerland Co.: during the last twenty-one years the greatest precipitation, 11.80, occurred in 1865; the least in that time, 0.52, in 1874.

Iowa.—Monticello, Jones Co.: the greatest precipitation for May during the last thirty-four years, 7.97, occurred in 1858; the least, 0.76, in 1874.

Kansas.—Independence, Montgomery Co.: the total precipitation for the spring of 1887, 9.02, is 1.03 below the average for the last fifteen years.

Lawrence, Douglas Co.: the total precipitation for the first five months of 1887, 10.01, is 2.14 below the average for the same months in the preceding nineteen years.

Wellington, Sumner Co.: the greatest precipitation for May during the last nine years, 9.37, occurred in 1881; the least, 0.88, in 1886.

Yates Centre, Woodson, Co.: the total precipitation for May, 1887, 2.47, is, with one exception, viz., 1.85 in 1884, the smallest May precipitation recorded during the last seven years.

Maine.—Gardiner, Kennebec Co.: the total precipitation for May, 1887, is 1.08; only twice in fifty-one years has the precipitation for May been less, viz., in 1852 and 1860.

Maryland.—Cumberland, Alleghany Co.: the precipitation for May in the past fifteen years is shown in the following table:

Year.	Precipitation.	Year.	Precipitation.
	Inches.		Inches.
1873.....	4.20	1882.....	3.80
1874.....	1.50	1883.....	4.73
1875.....	0.30	1884.....	5.33
1876.....	1.60	1885.....	2.58
1877.....	1.90	1886.....	3.62
1878.....	1.70	1887.....	5.64
1879.....	1.10		
1880.....	2.34	Average.....	2.77
1881.....	1.29		

Fallston, Harford Co.: during the last sixteen years the greatest precipitation for May, 8.25, occurred in 1886; the least, 0.70, in 1875.

New Midway, Frederick Co.: the greatest precipitation for May during the last six years, 9.75, occurred in 1886; the least, 2.37, in 1883.

New Jersey.—South Orange, Essex Co.: the total precipitation for the spring of 1887, 5.06, is 3.76 below the average for the last seventeen years.

New York.—Palermo, Oswego Co.: during the last thirty-four years the greatest precipitation for May, 6.90, occurred in 1867; the least, 0.80, in 1870. The total precipitation for the spring of 1887, 4.05, is 3.07 below the average for the same period.

Ohio.—Wauseon, Fulton Co.: the largest precipitation for May during the last fifteen years, 6.25, occurred in 1880; the least, 1.14, in 1877. The total precipitation for the spring of 1887, 6.51, is 3.17 less than the average, and is the smallest precipitation since 1872, which had a total of 6.00 inches.

Pennsylvania.—Dyberry, Wayne Co.: during the last seventeen years the largest precipitation for May, 5.19, occurred in 1882; the least, 0.36, in 1875.

South Carolina.—Spartanburg, Sumter Co.: the greatest precipitation for May during the last seven years, 4.24, occurred in 1885; the least, 1.24, in 1882.

Texas.—New Ulm, Austin Co.: during the last fifteen years the greatest precipitation for May, 15.25, occurred in 1884; the least, 0.05, in 1886. The total precipitation for the spring of 1887 (March, April, and May), 5.00, is 9.61 less than the average for the same period.

Vermont.—Stratford, Orange Co.: the greatest precipitation for May during the last thirteen years, 4.65, occurred in 1884; the least, 0.40, in 1877.

Virginia.—Wytheville, Wythe Co.: the total precipitation of the first five months of 1887, 16.24, is 1.58 less than the average for the same months during a period of twenty-four years.

Dale Enterprise, Rockingham Co.: during the last seven years the greatest precipitation for May, 12.66, occurred in 1886; the least, 1.74, in 1881.

Variety Mills, Nelson Co.: the greatest precipitation for May, during the last eight years, 8.22, occurred in 1886; the least, 1.70, in 1883.

SNOW.

The dates on which snow fell in the various states and territories are as follows:

California.—Fort Bidwell a, 6th; a, b, 10th; b, 11th.

Colorado.—Denver and Montrose, 1st, 2d; Pike's Peak, 1st, 2d, 7th, 13th, 15th to 19th, 21st to 24th, 26th to 29th, 31st.

Dakota.—Fort Meade and Deadwood, 1st; Fort Yates and Bismarck, 1st, 2d; Richardton, 1st, 16th; Fort Sisseton, 2d; Fort Pembina, 16th, 17th.

Idaho.—Fort Sherman, 10th.

Minnesota.—Moorhead, 2d.

Montana.—Helena, 1st, 11th to 13th, 20th; Fort Assinaboine, 12th.

Nebraska.—Fort Sidney, 1st; Fort Robinson, 1st, 13th. At Hay Springs, snow fell on the 1st, 3d, and 14th; a rain storm began at 9 a. m. on the 1st, and at 10 a. m. the rain changed to snow, which continued until late at night; on the morning of the 2d the snow averaged eight inches on the level, and had drifted, in places, to a depth of six feet.

Nevada.—Fort McDermit, 1st, 13th; Winnemucca, 10th.

New Hampshire.—Mount Washington, 1st, 30th.
New Mexico.—Fort Union, 1st.
Oregon.—Fort Klamath, Lakeview, and Linkville, 6th, 9th, 10th; Albany, 12th.
Utah.—Frisco and Salt Lake City, 1st. At the latter station the snow storm which began at 5.40 p. m., April 30th, continued during the night and until 2.35 p. m. on the 1st. Reports from neighboring towns state that trees of all kinds were injured by the snow collecting on them and breaking the branches.
Wyoming.—Cheyenne and Fort Laramie, 1st; Fort Bridger, 1st, 2d; Camp Sheridan, 2d, 7th, 11th to 15th.

Table of excessive and greatest monthly precipitation for May, 1887.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.			Date.	Amt.	
Alabama.				Nebraska.			
Livingston.....	26	2.65	6.42	Lincoln.....	12, 13	2.68	
Marion.....	4	2.15	6.00	Tecumseh.....	12	3.00	
Valley Head.....	31	2.00		Brownville.....	12, 13	3.75	
Opelika.....	27	2.73		Fremont.....	13	2.00	
Arkansas.				Fort Robinson.....	2	2.30	
Lead Hill.....			8.57	Cretu.....	12, 13	4.99	
Russellville.....	2 to 4	4.99	7.83	New Hampshire.			
Hot Springs.....	2 to 5	4.32	6.65	Woodstock.....	25	3.85	6.20
Fort Smith.....	2 to 4	3.08	6.51	North Carolina.			
Little Rock.....	3, 4	2.68	6.08	Weldon.....	10	6.03	8.07
Monticello.....	29	2.10		Goldsborough.....	8 to 10	4.03	7.83
Devalks Bluff.....	3, 4	2.07		Weldon.....	10, 11	6.78	7.57
Texarkana.....	3, 4	2.89		Salisbury.....			7.21
Do.....	11	2.13		Chapel Hill.....	9, 10	2.19	6.59
Dakota.				Do.....	31	2.14	
Deadwood.....	1	2.04		Marion.....			6.17
Florida.				Ohio.			
Manatee.....	24	2.55	9.69	College Hill.....	12, 13	2.75	6.25
Do.....	30, 31	2.49		Wooster.....	31	2.01	
Alva.....	10	3.25	8.55	Oregon.			
Do.....	30, 31	3.00		Astoria.....			7.33
Jacksonville.....	21, 22	2.75	7.15	Pennsylvania.			
Live Oak.....	10, 11	2.02	7.13	Pittsburg.....	7, 8	2.24	
Cedar Keys.....	23	3.04		South Carolina.			
Georgia.				Yemassee.....	13, 14	2.19	
Macon.....	19	2.95		Branchville.....	13, 14	2.40	
Waynesborough.....	11, 12	3.89		Greenville.....	31	2.00	
Indiana.				Charleston.....	22, 23	2.33	
Princeton.....			6.10	Tennessee.			
Marengo.....	23	2.00	6.03	Chattanooga.....			6.57
Kansas.				Rogersville.....	5, 6	2.15	
Belleville.....	12, 13	5.55	6.42	Andersonville.....	30, 31	2.00	
Concordia.....	12	2.28	6.08	Careyville.....	31	2.03	
Wakefield.....	21, 22	3.05		Grief.....	31	2.50	
Louisiana.				Fostoria.....	23	2.00	
Grand Coteau.....	3	2.19	6.50	Hurricane Switch.....	25, 26	3.36	
Lafayette.....	4	2.23	6.01	Texas.			
Do.....	19	2.21		Tyler.....	3, 4	7.70	10.29
Coushatta.....	3	2.69		Paris.....	1, 2	4.80	8.76
Natchitoches.....	3, 4	2.35		Do.....	27	2.05	
Minden.....	3, 4	2.57		Fort Elliott.....	27, 28	3.18	7.01
Alexandria.....	28, 29	2.10		Palestine.....	2 to 4	3.84	6.76
Monroe.....	4	2.08		Dallas.....	2, 3	3.41	6.52
Liberty Hill.....	2, 3	3.87		Belton.....	2, 3	2.03	6.47
Shreveport.....	3, 4	2.45		Austin.....	9	2.17	6.12
Maryland.				Longview.....	3	4.00	6.02
New Midway.....			6.12	Fort Ringgold.....	14, 15	3.05	
Cumberland.....	7, 8	3.79		Corsicana.....	3	2.20	
Michigan.				Houston.....	18, 19	2.14	
Thornville.....	23	2.17		Huntsville.....	3	2.00	
East Saginaw.....	30	2.00		Hearne.....	3	2.97	
Chelsea.....	23	2.87		Luling.....	3	3.00	
Minnesota.				Waco.....	17	2.30	
Duluth.....	1, 2, 3	3.30		Rio Grande City.....	15	2.48	
Mississippi.				Virginia.			
Okolona.....	4	7.50	8.75	Bappahannock.....	24	2.03	8.51
Natchez.....	3	2.45	6.16	Do.....	30	2.66	
				Dale Enterprise.....			6.54
				University of Va.....			6.03
				Washington Ter.....			
				Tatoosh Island.....			8.25

MONTHLY SNOWFALLS.

[Expressed in inches and tenths.]

The following stations report a monthly snowfall of one inch or more:

California.—Boca, 18; Summit, 5; Cisco, 4; Emigrant Gap, 3; Fort Bidwell, 2.5.
Colorado.—Pike's Peak, 23.7.
Dakota.—Deadwood, 18; Bismarck, 3.
Montana.—Fort Assinaboine, 4.
Nebraska.—Hay Springs, 8.
Nevada.—Toano, 1.5.
New Hampshire.—Mount Washington, 1.
Oregon.—Lakeview, 1.5.
Utah.—Salt Lake City, 3.5.
Wyoming.—Camp Sheridan, 2.5.

SNOW ON GROUND AT END OF MONTH.

The only station reporting snow on the ground at the end of month was Pike's Peak, Colo., where snow remained to a depth of 18 inches.

HAIL.

Saint Paul, Minn.: on the afternoon of the 1st a thunder-storm, with high winds, heavy rain, and hail, occurred. The hail fell from 7.18 to 7.25 p. m.; the stones varied in size from a pea to a walnut, and a few measured eleven inches in circumference. The wind attained its greatest force during the hail storm, and twenty-five small frame houses were damaged or entirely demolished. Window-glass in nearly every high building in the city was broken; the loss being estimated at \$10,000. The storm was quite severe in Minneapolis, where a large amount of window-glass was broken by the hail.

Duluth, Minn.: on the 1st, during a thunder-storm and heavy rain, hail fell rapidly, and in large quantities, some stones being one and a half inches in diameter. Many windows were broken and other property damaged; 3.15 inches of rain fell.

Pittsburg, Pa.: a thunder-storm, with heavy rain, prevailed from 8 to 11.35 p. m. of the 6th; from 8.05 to 8.20 p. m. the storm was accompanied by hail, which fell in sufficient quantity to cover the ground. The stones were about half an inch in diameter, but did little damage. During a thunder-storm on the afternoon of the 7th hail fell heavily for five minutes.

Belleville, Republic Co., Kans.: during the forenoon of the 12th a heavy rain passed from east to west; in the afternoon the heaviest rainfall that has ever been recorded here occurred. The storm was accompanied by hail which did but little damage at this place. On the 13th a rain storm was accompanied by hail of peculiar shape, the stones being round, flat, and oval, with projecting knobs; some of the larger stones measured five inches in circumference. A large part of the fruit crop was destroyed, and much damage done to grain.

New Orleans, La.: during a thunder-storm on the afternoon of the 18th heavy hail fell in the western part of the city and over the suburbs, doing considerable damage to gardens and buildings.

Concord, Cabarrus Co., N. C.: on the afternoon of the 19th a very destructive hail storm passed over the northern part of Cabarrus and southern part of Rowan counties. The hail fell, for forty-five minutes, over an area five miles wide and nine miles long and in some places to a depth, as reported by several persons, of eight inches, completely destroying the wheat, oat, and cotton crops, and stripping trees of leaves.

Valentine, Nebr.: on the afternoon of the 20th a thunder-storm, with hail, passed over the station from west to east. Hail fell from 6.40 to 6.50 p. m.; the stones were very large; a few were found to measure eight inches in circumference and weigh six ounces. They were formed of a nucleus of ice, surrounded by several alternate layers of snow and ice, and the whole having a thick covering of snow. Hail fell again from 7.25 to 7.40 p. m., but the stones were small.

Spartanburg, Spartanburg Co., S. C.: a thunder and hail storm occurred at this place on the afternoon of the 21st. At Glendale, in this county, much damage was done to the corn and cotton crops.

Franklin, Franklin Co., Nebr.: on the 22d, during a heavy thunder-storm, hail fell to a depth of two inches, stripping trees and shrubbery of leaves, beating crops to the ground, and injuring horses and cattle. Some of the stones were over an inch in diameter.

University of Virginia, Albemarle Co., Va.: a hail storm occurred in this vicinity on the 25th which caused considerable damage to vineyards, etc.

Fort Thomas, Ariz.: a violent thunder-storm set in at 1.34 p. m. of the 25th, at the same time the wind blew with gale force, and heavy hail fell, the stones varying from one-fourth to one and one-fourth inches in diameter. All windows facing

south and southwest were broken. The hail fell until 3.05 p. m., when 2.25 inches of rain and melted hail had fallen.

Sioux City, Woodbury Co., Iowa: on the afternoon of the 26th a heavy rain was followed by one of the most severe hail storms of many years, which did great damage to windows and growing crops.

Erie, Pa.: on the 30th a thunder-storm, moving from south to north, prevailed from 5.30 to 6.42 p. m. Temperature before the storm, 82°; wind, south; after the storm, temperature, 62°; wind, southwest. A severe hail storm passed over a section of country near here, doing considerable damage to vegetation of all kinds. At Edinborough, twenty miles south, all windows in the south side of the buildings were broken by hail, and trees blown down by the wind.

Atlanta, Ga.: a heavy thunder-storm, with hail, approached from the northwest on the afternoon of the 31st. The hail fell for three minutes only, but in sufficient quantity to do considerable damage to growing crops.

Hail is also reported to have occurred as follows:

- Alabama*.—Mobile, 23d; Montgomery, 24th.
Arizona.—Fort Bowie, 25th, 30th; Fort Grant, 25th; Whipple Barracks, 26th; Fort Apache, 27th.
Arkansas.—Lead Hill, 4th, 10th, 31st.
California.—Nicolaus, Fort Bidwell, and Red Bluff, 6th.
Colorado.—Pike's Peak, 22d, 23d; Colorado Springs, 22d, 26th.
Dakota.—Fort Totten a, 1st; Fort Totten b, 7th; Parkston, 12th, 21st; Huron, 13th; Fort Sully, 14th, 26th; Webster, 23d; Bismarek, 25th; Fort Pembina, 20th.
Florida.—Jacksonville, 10th.
Georgia.—Forsyth, 11th; Atlanta, 31st.
Idaho.—Fort Sherman, 5th, 7th, 10th, 11th.
Illinois.—Cairo, 31st.
Indiana.—Butlerville, 1st; Mauzy, 2d, 21st; Vevay, 11th; Logansport, 21st, 22d, 24th; Indianapolis, 21st.
Indian Territory.—Fort Supply, 14th, 26th; Fort Reno, 23d.
Iowa.—Independence, Cresco, Fort Madison, and Oskaloosa, 1st; Davenport, 1st, 29th; Muscatine, 14th; Clinton and Des Moines, 21st; Keokuk, 22d; Oskaloosa b, 29th.
Kansas.—Belleville, 12th, 13th, 21st; Wakefield, 12th, 13th, 22d; Salina, 12th, 13th, 20th, 26th; Concordia, 12th, 22d; Alton, 13th; Ninnescah, 13th, 15th, 16th, 21st; Wilson, 13th, 15th, 22d; Dodge City, 23d, 24th; Independence, 24th.
Kentucky.—Harper's Ferry, 11th, 24th.
Louisiana.—Liberty Hill, 29th.
Maryland.—New Midway, 6th; Cumberland, 7th, 8th; Woodstock, 26th.
Michigan.—Traverse City, 2d; Marquette, 22d; Thornville, 23d, 30th; East Saginaw and Escanaba, 24th.
Minnesota.—Fort Snelling and Moorhead, 1st; Minneapolis, 1st, 21st; Duluth and Saint Paul, 1st, 29th; Saint Vincent, 19th, 28th.
Missouri.—Fayette, 1st, 22d.
Nebraska.—Niobrara, 13th, 20th; Fort Robinson and Genoa, 16th; Hay Springs, 20th; Brownville, 26th.
Nevada.—Fort McDermitt and Carson City, 19th.
New Jersey.—Readington, 27th; South Orange, 28th.
New Mexico.—Fort Union, 15th; Gallinas Spring, 17th, 27th; Fort Seldon, 25th; Santa Fé, 26th.
New York.—Albany 2d, 5th; Humphrey, 6th, 26th; New York City, 26th.
North Carolina.—Flat Rock, 16th; Lenoir, 30th.
Ohio.—Cleveland a, 1st, 2d; Wauseon, 1st, 2d, 31st; Cleveland b, 2d; Lordstown, 7th; College Hill, 11th, 12th; Columbus, 22d; Ruggles, 23d; Westerville, 24th; Tiffin, 30th.
Oregon.—Bandon, 2d, 10th; Albany, 6th, 10th; East Portland, 7th, 8th; Mount Angel, Ashland, Astoria, and Roseburg, 10th.
Pennsylvania.—Pittsburg, 26th; Blooming Grove, 27th; Erie, 30th.
South Carolina.—Spartanburg, 9th, 21st.
Tennessee.—Milan, 7th, 26th; Knoxville, 9th, 25th; Ashwood,

10th, 25th, 27th; Chattanooga, 10th, 30th; Nashville, 13th, 25th; Austin, 25th.

Texas.—Palestine, 2d, 10th; Abilene, 8th, 9th; Fort Concho, 24th; Silver Falls, 26th.

Vermont.—Lunenburg, 26th.

Virginia.—Dale Enterprise, 6th, 25th, 26th.

Washington Territory.—Port Angeles, 5th; Spokane Falls, 10th.

West Virginia.—Clarksburg and Middlebrook, 26th.

Wisconsin.—Embarras, Madison, and Manitowoc, 29th.

Wyoming.—Fort Laramie, 11th, 12th, 27th; Camp Sheridan, 31st.

SLEET.

Sleet fell at the various places during the month, as follows: Cheyenne, Wyo., 1st; Moorhead, Minn., 2d; Tatoosh Island, Wash., 5th, 7th; Roseburg, Oregon, 6th; Pike's Peak, Colo., 13th; Alma, Colo., 15th.

DROUGHT.

Drought has prevailed over a large part of the country during the month, as a result of the small rainfall of April and May; it has been most severe in portions of New England and in the northwestern and western sections of the country. The rains of the latter part of May, in some instances, terminated droughts which were reported to have been the most severe experienced in years.

Concerning the drought of May, the following notes are given:

California.—San Diego, 16th: the weather is very dry in this part of the state; the pastures are drying up.

San Francisco, 28th: reports from the northern and central portions of California show that the hot winds of the past two days caused serious injury to the wheat crop, and also to strawberries and other fruits.

Dakota.—Parkston, Hutchinson Co., 31st: the month has been hot and dry, and the grain crop has been seriously injured in consequence.

Georgia.—Atlanta, 21st: the prolonged drought in this vicinity was broken by the rains of the 19th and 20th; prior to these rains vegetation was suffering seriously.

Illinois.—Elgin, Kane Co., 21st: farmers from the surrounding country report that, owing to drought, the pastures have become exhausted, and the crops are much injured. Some of the rye fields have been ploughed over and planted with corn.

Chicago, 21st: a dispatch from Saint Paul, Minn., to "The Times" states that reports from various points in Minnesota and Dakota show that rain is greatly needed, especially in the Red River Valley, and that the grain crops have suffered seriously.

Indian Territory.—Fort Reno: previous to the 10th the weather was very dry and it was feared that crops would be a failure; they were greatly benefited, however, by rains of the 10th and 11th, on which dates the rainfall amounted to about one and one-half inches.

Iowa.—Dubuque, 25th: the ground is very dry in this section of the state, and farmers report that crops, especially hay, are being injured by drought.

Des Moines, 31st: reports from the central and western portions of the state say that rain is much needed.

Oskaloosa, Mahaska Co., 31st: May has been a very dry month; the pastures are much injured; corn is doing well.

Cresco, Howard Co., 31st: the drought which has prevailed since May 1st has not been exceeded in severity for thirty years; some barley fields have been ploughed up; the hay crop will be short. The total rainfall for the month was but eight-tenths of an inch.

Cedar Rapids, Linn Co., 31st: the month just closed, in this section has been one of the driest for years. The growing crops are not yet suffering seriously, but the pastures are nearly bare, and in some sections of the state it is reported that the hay crop will be very short. The monthly rainfall at Oskaloosa amounted to but little more than one inch.

Maryland.—Fallston, Harford Co., 31st: the warm, dry weather from the 10th to 24th had an injurious effect; small garden seeds near the surface did not germinate until the occurrence of the rains at the close of the month.

Michigan.—Muskegon, Muskegon Co., 18th: this region is suffering from a severe drought; but little rain has fallen since the winter snowfall melted; all crops are suffering.

Thornville, Lapeer Co.: up to the 23d the month was hot and dry, but on that date there was a heavy rain. The drought caused much injury to the clover crop.

Birmingham, Oakland Co., 31st: drought prevailed during the greater part of this month and caused much damage to the growing crops.

Minnesota.—Saint Paul, 27th: the drought in central Wisconsin continues unbroken. Rain is also needed in northern Iowa, although no damage to crops is yet reported.

Rochester, Olmsted Co.: nearly an inch of rain fell at this place on the 8th, ending the long-continued drought which prevailed in this section.

Lanesborough, Fillmore Co., 30th: the protracted drought in this section

was broken by the copious rains at the close of the month. The drought has been of unusual severity and has caused much injury to crops, but wheat, oats, and corn were greatly revived by the rains.

Mississippi.—Vicksburg: a heavy rain began in the early morning and ended at 8.25 a. m. on the 4th. Reports from the surrounding country show that this rain was general, breaking the long-continued drought. Crops were in such condition that had the drought continued for another week the result would have been disastrous.

Nebraska.—Brownville, Nemaha Co.: the drought in this section was broken by the rain of the 10th.

Omaha: the rainfall throughout Nebraska during the night of the 12-13th was of great benefit to the crops which, at that time, were beginning to suffer from drought.

New Jersey.—The "New York Sun" of May 21st contained the following: "The drought is getting to be serious in New Jersey. Small seeds do not germinate, and kitchen gardens are being replanted, and in some cases planted for the third time. Extensive raisers of garden truck place hay about their plants to retain what moisture is collected at night. Grain is rushing into head before its time. It will not fill, and the straw will be short. It is feared that early small fruits will be almost a failure. Wells are dry, and springs that were never known to fail before are without a pint of water. The hauling and peddling of water in barrels is already a part of the season's work."

New York.—Humphrey, Cattaraugus Co., 22d: the crops are suffering for want of rain; the streams are very low.

New York City, 25th: the surrounding country is suffering from severe drought; on the 26th 0.35 inch of rain fell, which was much needed in this section.

Factoryville, Tioga Co.: from the 1st to the 24th no appreciable amount of rain fell, and the roads were very dry and dusty; from the 24th to the 31st the rainfall amounted to 1.32 inches.

North Carolina.—Reidsville, Rockingham Co., 31st: previous to the 6th wheat, oats, and corn suffered from drought, but were greatly improved by subsequent rains.

Ohio.—Wauseon, Fulton Co.: the drought was broken by the rain of the 23d and 24th. The spring season in this vicinity has been the driest for the last fifteen years.

Tiffin, Seneca Co.: a much needed rain fell in this vicinity on the 30th.

Pennsylvania.—Quakertown, Bucks Co., 26th: the drought up to this date has not injured vegetation in this locality, but the streams and wells are low, and cisterns are dry; some people are hauling water for domestic use, etc.

South Carolina.—Kirkwood, Kershaw Co., 31st: in this immediate neighborhood the rainfall has been insufficient for the crops, but in this county, generally, the crops are very promising.

Texas.—A special dispatch from Laredo, Tex., to the "Saint Louis Globe-Democrat" on the 13th stated that the rain of that date was the first of any consequence that had fallen at Laredo in eight months.

Wisconsin.—La Crosse, 31st: the month was characterized by the drought which prevailed from April 23d, and which was only broken by light rains on the last few days of the month. The total precipitation for the month was 0.50 inch, the least that has been recorded for this month since the establishment of the signal station here.

Delavan, Walworth Co., 31st: the protracted drought was broken on the 22d by a heavy rainfall.

WINDS.

The most frequent directions of the wind during May, 1887, are shown on chart ii by arrows flying with the wind; in the lower lake region and Ohio Valley they were from the north-east; in the Gulf States, and along the Atlantic coast, from southeast to southwest; in the upper Mississippi valley, upper lake region, north Pacific coast, and Rocky Mountain regions, variable; in California, from the west or southwest.

HIGH WINDS (in miles per hour).

Wind-velocities of fifty or more miles per hour, (on mountain stations at or exceeding 70 miles) other than the maximum velocities for the month, which are given in the table of miscellaneous data:

Fort Totten, Dak., 51, n., 29th.

Valentine, Nebr., 50, nw., 1st.

Mount Washington, N. H., 78, nw., 1st; 77, nw., 4th; 86, nw., 12th.

Pike's Peak, Colo., 70, sw., 1st.

LOCAL STORMS.

Pittsburg, Penn.: a violent wind and rain storm occurred during the afternoon of the 5th along the Pennsylvania Railroad, about forty-five miles east of Pittsburg. Considerable damage was done to the bed of the Ligon Valley Railroad; trains were delayed for several hours.

Columbus, Ohio: a thunder-storm, with heavy rain and high wind, set in about 6 p. m. of the 5th; maximum velocity of the wind thirty-two miles per hour, from the south. The storm did considerable damage in different parts of the city. A church steeple, and numbers of trees, sheds, and fences were blown down. Severe thunder-storms occurred also on the afternoon of the 22d and 23d; the storm of the 22d was accompanied by hail, which did some damage to vegetation. On the 23d the electrical part of the storm was intense, the lightning being vivid and incessant.

Buffalo, N. Y.: on the night of the 5-6th a severe thunder-storm prevailed from 10 p. m. until 3 a. m. and did considerable damage in this city and vicinity. The lightning was vivid and almost continuous; several buildings were struck of which three were burned, and the remainder slightly injured. A destructive thunder-storm, accompanied by heavy rain, occurred also on the 7th.

New York City, 6th: much damage was done by lightning in the northern and western portions of New York on this date. Reports from Binghamton, Broome Co., Livonia, Livingston, Co., and Canajoharie, Montgomery Co., give accounts of dam-

age done at those places. At Canajoharie buildings valued at \$12,000 were destroyed.

Abilene, Tex.: on the night of the 8-9th a thunder-storm, with hail and high wind, occurred; from 1.30 to 1.45 a. m. the wind blew at the rate of fifty-two miles per hour, but did very little damage; this is the highest velocity the wind has reached since this station was established in 1885. A thunder-storm, with hail, prevailed from 6.45 to 8.50 p. m. of the 9th.

Weldon, Halifax Co., N. C., 10th: light rain fell from 10 a. m. to 12.30 p. m., when it increased to a heavy rain, which from 1 to 4 p. m. fell in torrents; after 4 p. m. light rain continued until about midnight. During this time more than six inches of rain fell. The meteorological record at this place extends back fifteen years and this is the heaviest rainfall for that period.

Washington, Wilkes Co., Ga.: about 5 p. m. of the 11th a violent wind, rain, and hail storm occurred in this vicinity. A number of buildings were either blown down or unroofed, and many trees prostrated. The hail caused much damage to crops.

Omaha, Nebr.: during the evening of the 13th a severe wind and rain storm prevailed in eastern Nebraska. In this city several small houses were wrecked and lumber piles scattered.

Frederick, Brown Co., Dak.: A severe southwesterly gale began at this place at about 6 p. m. of the 14th; considerable damage was done to lightly constructed buildings.

Petoskey, Emmet Co., Mich.: during a severe wind-squall at 11.30 a. m. of the 22d, a yacht was capsized on Little Traverse Bay, and six persons were drowned.

Delevan, Walworth Co., Wis.: a heavy rain storm occurred on the 22d; the rain fell in torrents and was accompanied by very high winds which did damage to fences and shade trees.

Wakefield, Clay Co., Kans.: during the thunder-storm of the 22d small out-buildings and fences were prostrated, and one house unroofed.

Clay Centre, Kans.: at Idana, eight miles west of this place, a severe wind storm prevailed at about 6.30 p. m. on the 23d. A number of dwellings and a school-house were blown down, and several railway cars were blown from the tracks.

Montgomery, Ala.: a destructive thunder-storm passed over this city between 2.47 and 3.40 p. m. of the 24th. Rain fell from 3.08 to 4.04 p. m. At 3.10 p. m. the wind suddenly increased from a velocity of ten miles per hour to gale force, blowing for a short time at the rate of forty-seven miles per